UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 17, 2002

MEMORANDUM TO: Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards

FROM: Robert M. Latta, Sr. On-Site Licensing Representative
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SUBJECT U.S. NUCLEAR REGULATORY COMMISSION ON-SITE LICENSING REPRESENTATIVES' REPORT ON YUCCA MOUNTAIN PROJECT FOR MARCH 1, 2002, THROUGH APRIL 30, 2002

The purpose of this letter is to transmit the U.S. Nuclear Regulatory Commission (NRC) On-Site Representatives' (ORs) report for the period of March 1, 2002, through April 30, 2002.

This report highlights a number of Yucca Mountain Project activities of potential interest to NRC staff. The ORs continue to respond to requests from NRC Headquarters staff to provide various documentation and feedback related to Key Technical Issues (KTIs) and their resolution. During this reporting period, the ORs continued to observe activities associated with Yucca Mountain Site Characterization, KTIs, and auditing. The ORs also attended various meetings and accompanied NRC staff on visits to Yucca Mountain.

If you have any questions on this report or its enclosures, please call Robert Latta on (702) 794-5048; Jack Parrott on (702-794-5047) or Philip Justus on (301) 415-5669.

Enclosures: U.S. Nuclear Regulatory Commission On-Site Licensing Representatives' Report
ESF/ECRB Plan View Alcove, Niche and Borehole Test Locations
Nye County Early Warning Drilling Program Drillhole Locations
ATC Site Layout/ATC Cross-hole Configuration

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U.S. NUCLEAR REGULATORY COMMISSION

ON-SITE LICENSING REPRESENTATIVES' REPORT

NUMBER OR-02-02

FOR THE REPORTING PERIOD OF MARCH 1, 2002 THROUGH APRIL 30, 2002

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REPORT DETAILS

1.0 EXECUTIVE SUMMARY

REVIEW OF WELDED SPECIMEN RECORDS

The ORs reviewed selected quality assurance records pertaining to Titanium specimens and welded alloy 22 specimens (that were prepared to simulate the proposed waste package closure welds). Tests were performed on these specimens to identify the extent of weld flaws, base metal imperfections, orientation of flaws, and to characterize the flaws based on metallurgical analysis.

Based on the results of these reviews, it was determined that the pertinent work packages contained appropriate quality requirements and that the specified work performed under the Framatome QA program accurately identified the technical requirements for the welding and non-destructive tests to examine the welds.

Subsequent to the preparation of test specimens at Metal Samples Corporation several problems were identified by Bechtel SAIC Company, LLC (BSC) Quality Assurance and a Corrective Action Request (CAR) was initiated. During the review of these activities, it was noted that the performance of timely surveillances at the vendor facility, (Metal Samples Corporation) may have averted the incorrect sectioning of samples before transferring the necessary heat numbers and other traceability information to the test coupons.

OFFICE of CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM) OVERSIGHT OF NAVAL NUCLEAR PROPULSION PROGRAM (NNPP)

The ORs reviewed the OCRWM oversight of the NNPP activities in support of the potential acceptance of Naval Spent Nuclear Fuel (SNF). Specifically, the ORs conducted discussions with representatives of DOE's Office of Quality Assurance (OQA), and BSC's QA organization, in order to establish the roles and responsibilities of these oversight organizations. The ORs also reviewed the Memorandum of Understanding for Acceptance of Naval SNF, and the revised NNPP Technical Baseline Completions Document and coordinated with appropriate staff at NRC Headquarter.

Based on the results of these discussions and review activities it was concluded, for the current status of the OCRWM and NNPP programs, that appropriate provisions had been established for the potential acceptance of Naval SNF and that adequate documentation existed to support these activities.

QA TECHNICAL REQUIREMENTS NOT INCORPORATED

The ORs evaluated the results of Bechtel SAIC Company, LLC (BSC), response to NRC open Item 01-02 involving the failure to include appropriate QA and technical requirements in purchase orders issued to suppliers.

Based on the review of BSC's program enhancements related to invoking QA and technical requirements on sub-tier suppliers, it was concluded that improved process controls have been developed and that identified deficiencies in this area have been appropriately addressed. Therefore, NRC, OR Open Item 01-02 is considered closed.

DOE AUDIT OF YUCCA MOUNTAIN SITE CHARACTERIZATION OFFICE

Based on the review of additional documentary information related to the qualification and training of project personnel, NRC, OR Open Item 01-01 was reviewed and closed.

RECURRING DEFICIENCIES

In response to recurring deficiencies identified in scientific notebooks, DOE/OQA has developed program enhancements directed at reducing the number of errors. Although progress has been achieved the overall effectiveness of these efforts continue to be evaluated. The ORs will monitor these activities and the results will be documented in a future OR report.

GENERAL SITE AND TESTING ISSUES

A site work stand-down has led to the stoppage and/or delay of many of the ongoing tests, and the initiation of new test work, at the site. The stand-down is the result of a near miss electrical incident at the surface support area of the Exploratory Studies Facility. The State of Nevada also terminated DOE's permits to access to Nevada Test Site water wells for water supply to the Project. As a result of the above the following testing was impacted.

EXPLORATORY STUDIES FACILITY (ESF) TESTING

There has been an interruption or postponement of some tests in the ESF due to the site stand-down. The drift scale thermal test continues its cool down phase.

ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) TESTING

There has been an interruption or postponement of some tests in the ECRB due to the site stand-down. To date, no dripping water has been observed in the portion of the ECRB that has been isolated behind bulkhead at 17+63. A planned April entry beyond the sealed bulkhead was not accomplished due to the work stand-down.

OTHER FIELD TESTING

The cross-hole tracer tests at the well 19 complex of the Nye County Early Warning Drilling Program have been put on hold indefinitely. However, the State of Nevada now considers the previously granted permit waivers for all tests at the well 19 complex to be expired as of April 9, 2002.

LABORATORY STUDIES

Results continue to show strongly reducing chemical conditions in the tuff block being used in the Busted Butte unsaturated zone transport test. Research is continuing on the origin and persistence of reducing conditions in this block.

UPCOMING TESTS AND STUDIES

Upcoming tests and/or studies are being planned for the closed portion of the ECRB cross drift, at the engineered barrier system testing facility (Atlas), in Inyo County, California (deep drilling program), and at Pena Blanca, Mexico (natural analog program).

REPORT DETAILS

2.0 INTRODUCTION

The principal purpose of the OR report is to inform NRC staff, managers, and contractors of information on the DOE programs for site characterization, repository design, performance assessment, and environmental studies that may be of use in fulfilling NRC's role during pre-licensing consultation. The primary focus of this and future OR reports will be on DOE's programs for the ESF, surface-based testing, performance assessment, data management systems, and environmental studies. Relevant information includes new technical data, DOE's plans and schedules, and the status of activities to pursue site suitability. The ORs also participate in activities associated with resolving NRC Key Technical Issues's (KTIs). This report covers the period of March 1, 2002, through April 30, 2002.

3.0 OBJECTIVES

The OR mission is to serve principally as a point of prompt informational exchange and to identify preliminary concerns about site investigations relating to potential licensing issues. The ORs accomplish this function by gathering and evaluating information, communicating, identifying concerns, and raising more significant issues to managements attention. Communication is achieved by exchanging information on data, plans, schedules, documents, activities and pending actions, and resolution of issues. The ORs interact with DOE scientists, engineers, and managers with input from NRC Headquarters management on NRC policy, philosophy, and regulations. The ORs also focus on such issues as QA, design controls, data management systems, performance assessment, and KTIs resolution. A primary OR role is to identify areas in site characterization and related studies, activities, or procedures that may be of interest or concern to the NRC staff.

4.0 QUALITY ASSURANCE AND ENGINEERING

Review of Welded Specimen Records

During this reporting period the ORs reviewed selected quality assurance records pertaining to the welded, Alloy 22 specimens that were prepared to simulate the proposed waste package closure welds and the Titanium drip shield material. Tests were performed on these specimens to identify the extent of weld flaws, base metal imperfections, orientation of flaws, and to characterize the flaws based on metallurgical analysis. Because there is limited industry data related to the application of Alloy 22 , DOE's Office of Civilian Radioactive Waste Management (OCRWM) and its contractor, Bechtel SAIC Company, LLC (BSC), plan to use the data to perform volumetric analysis and to collect information related to stress corrosion cracking.

The ORs reviewed the BSC Waste Package Project Work Direction for the designated subcontractor, Framatome, contained in "Work Supporting Waste Package Development Program" WPD WD01-011. This document, which had been developed to evaluate the optimum welding operation suitable for the closure weld also contained the "Statement of Quality and Technical Requirements" for work packages associated with waste package

engineering and fabrication, and deferred waste package stress corrosion cracking and other tests (including strain testing).

Based on the review of the documents discussed above, it was determined that BSC had appropriately prepared the work scope for welding the specimens and included procurement, welding, and inspection criteria for the Alloy 22 welded specimens and Titanium material specimens by Framatome. The work scope document also outlines the applicable quality and technical requirements affecting two work packages contained in Framatome Fiscal Year 2001 Statement of Work.

As a result of these reviews (see above) it was determined that in 1999, approximately 70 feet of the Alloy 22 and 4 feet of the Titanium plate, welded by Framatome, were sent to Metal Samples Corporation (MSC) to be cut into test coupons for use in corrosion testing of the weld heat affected zone. These test coupons were sent to Lawrence Livermore National Laboratories (LLNL) and McDermott Technologies for corrosion testing. Subsequent to the shipment of these test coupons it was determined that MSC had not maintained appropriate traceability on the samples and that some of the samples had been incorrectly cut. The deficiency associated with the loss of traceability on the test coupons was documented in Corrective Action Request BSC (V)-02-C-002 and Nonconformance Report (NCR) YMSCO -01-0021. The incorrect configuration of the test coupons was documented in Deficiency Report (DR) BSC (V)-01-D-124 and NCR YMSCO-01-0035.

In response to these issues BSC QA evaluated the cumulative effects of these conditions. The results of these evaluations indicated that the above noted deficiencies associated with MSC were not related to the quality of the Framatome supplied welded plate. Accordingly, CAR BSC (V) -02-C-002 was closed on April 4, 2002, and MSC was removed from the OCRWM Qualified Suppliers List. The related DR BSC (V)-01-D-124 concerning the misplacement of the weld location on the specimens during fabrication was closed on December 12, 2001. Similarly NCRs YMSCO -010035 and -01-0021 which documented weld specimen location discrepancies were closed and the affected test coupons sent to LLNL and McDermott Technologies were segregated and red tagged and these specimens will not be used for any further testing.

Based on the results of the ORs discussions with BSC QA personnel and the review of project documentation related to the welded, Alloy 22 and Titanium specimens, it was determined that the pertinent Statement of Quality and Technical Requirements work packages contained appropriate quality requirements and that the specified work performed under the Framatome QA program accurately identified the technical requirements for the welding and non-destructive tests to examine the welds. However, it was noted that the performance of timely surveillances at the vendors, such as, MSC may have averted the incorrect sectioning of samples before transferring the necessary heat numbers and other traceability information to the test coupons. Within the areas evaluated no open items were identified.

OCRWM Oversight of Naval Nuclear Propulsion Program

The ORs reviewed OCRWM oversight of the Naval Nuclear Propulsion Program (NNPP) activities in support of the potential acceptance of Naval Spent Nuclear Fuel (SNF) for disposal. Specifically, the ORs held discussions with representatives of DOE's Office of Quality Assurance (OQA) and BSC's QA organization, in order to establish the roles and responsibilities of these oversight organizations. The ORs also reviewed the Memorandum of

Understanding for Acceptance of Naval SNF, Revision 1, dated April 11, 2000, and the revised NNPP Technical Baseline Completions Document Revision 00, dated June 2001.

Additionally, the ORs reviewed recent OCRWM Observation reports concerning Naval SNF cannister fabrication activities at Ionics Inc. on April 25, 2001, and Hamill Manufacturing Company on November 9, 2000. The reports documented the witnessing of various process operations and reviews of records, including data books, material and test certifications, weld and non-destructive testing records, and inspection reports. No deficiencies were noted in the OQA observation reports.

Current and planned OQA oversight activities included the witnessing of corrosion testing of Navy samples at Lawrence Livermore National Laboratory in June 2002 and witnessing canister fabrication at the Precision Components Corporation (PCC) plant in York, PA in September, 2002. The NRC is planning to observe the OQA activities at PCC, and to attend a related NNPP briefing on their program in Washington DC.

The agenda, issues and related documentation for OCRWM's OQA Annual QA Review of the NNPP QA Program and related meetings was reviewed. As a result of this review it was noted the OQA Annual QA Review indicated that "OCRWM OQA finds that the NNPP QA Program remains acceptable and continues to support the acceptability of Naval SNF for disposal."

Based on the results of these discussions and review activities, the ORs concluded, that appropriate provisions had been established for the potential acceptance of Naval SNF for disposal and that adequate documentation existed to support these activities. No concerns were identified as a result of these reviews.

QA Technical Requirements Not Incorporated

As previously documented in OR Report 05-01, dated December 20, 2001, a review of four recent DOE audits of suppliers listed on the Qualified Suppliers List, indicated that purchase orders had been issued which failed to include appropriate QA and technical requirements. This condition was identified as a repetitive condition and was documented as NRC OR Open Item 01-02.

In response to this issue, BSC Quality Assurance provided the clarification that they had recognized the need to improve supplier performance prior to the identification of the open item. Specifically, in May 2001, BSC QA began initiating several actions in an effort to eliminate future supplier conditions adverse to quality. These actions to prevent recurrence included; (1) assignment of BSC Procurement QA Representatives (PQARs) to specific suppliers as a point of contact, (2) in-depth discussions with potential suppliers prior to the initial survey, and (3) during interactions the PQARs will reinforce the need for suppliers to meet the Yucca Mountain Project QA requirements. Additionally, the project has developed a guideline to improve the annual supplier evaluation process and supplemental audits and surveillances will be performed if deficiencies are identified in supplier programs. The ORs also determined that letters have been sent to all suppliers with open Purchase Orders which reinforce the supplier's contractual obligation to implement appropriate QA requirements. Furthermore, supplier agreements have been modified to specify that appropriate QA and technical requirements of the contractor's procurement document shall be reflected in all sub-tier supplier's purchase orders adequately describing those requirements.

Based on the review of BSC's program enhancements related to invoking QA and technical requirements on sub-tier suppliers, it was generally concluded that improved process controls have been developed and that identified deficiencies in this area have been appropriately addressed. Therefore, NRC, OR Open Item 01-02 is considered closed.

RECURRING DEFICIENCIES

OR Report 02-01, dated June 14, 2001, identified an adverse trend concerning recurring deficiencies in scientific notebooks. As a result of the increased number of deficiencies, DOE/OQA evaluated these conditions and developed several recommendations to enhance the controls for scientific notebooks and reduce the incidence of errors. Although progress related to the implementation of these program enhancements has been achieved, the overall effectiveness of these efforts continues to be evaluated. The ORs will monitor these activities and the results will be documented in a future OR report.

DOE QA AUDIT OF YUCCA MOUNTAIN SITE CHARACTERIZATION OFFICE

As documented in OR Report 04-01, dated September, 28, 2001, the ORs observed DOE's QA audit of the Yucca Mountain Site Characterization Office (YMSCO) in Las Vegas, Nevada. The purpose of this audit was to evaluate the effectiveness of the OCRWM QA Program at the YMSCO office. Specifically, the audit team evaluated the implementation of selected requirements of DOE/RW-0333P, Quality Assurance Requirements and Description document and the associated procedures.

During the audit the ORs reviewed the Position Descriptions (PDs) of three employees in order to determine if these individuals possessed the necessary educational, training and work experience to demonstrate compliance with elements in their respective PDs. Based on the results of these reviews it was determined that two of the employees had the requisite qualifications and satisfied all elements of their PDs. However, evaluation of the remaining PD was left open, (NRC, OR Open Item 01-01) pending the receipt of additional training records.

During this reporting period the ORs completed the evaluation of the supplemental training and qualification records for the third employee. As a result of these reviews it was determined that although the training records did not expressly identify completion of all of the requisite training and job related experience associated with the PD, the individual had successfully completed a DOE sponsored upward mobility program. It was also determined that the individual has been actively engaged in the performance of their duties for approximately three years and that during this period of time they have demonstrated an acceptable level of performance. Based on the review of the supplemental information provided by DOE, it was determined that the remaining individual, by virtue of their performance in the assigned position, appears to satisfy the elements contained in the functional PD. Therefore, NRC Open Item 01-01, is considered closed.

5.0 OUTREACH ACTIVITIES

On-Site Representatives Participates in University of Nevada, Las Vegas, Seminar on Yucca Mountain

On March 8, 2002, the ORs participated in a continuing education seminar at the University of Nevada, Las Vegas (UNLV). The topic of the evening seminar series was "What is Being Done to Protect Nevada." The evening seminar included two presentations. The Department of Energy staff provided information on the design for the potential Yucca Mountain repository. The ORs made a presentation that addressed NRC's responsibilities, independent oversight role, and licensing process. A question and answer session followed. The seminar provided an opportunity for NRC staff to interact with students and members of the community. This opportunity allowed the attendees to learn more about NRC's role as a regulator (of the proposed repository at Yucca Mountain). Because this seminar is part of a continuing education series, the NRC could be invited to address future seminars.

Public Meetings on the Nuclear Regulatory Commission's Role in Regulating a Possible Geologic Repository at Yucca Mountain

On April 8, 9, and 10, 2002, the staffs of the Division of Waste Management (DWM) and the Spent Fuel Project Office (SFPO) held public meetings in Beatty, Tonopah, and Ely, Nevada. These meetings were supported by staffs from the NRC's OR Office in Las Vegas, the Offices of the General Counsel and Nuclear Reactor Regulation, and the Center for Nuclear Waste Regulatory Analyses (Center). Staff made presentations on NRC's regulatory program, recent pre-licensing activities, and the role of the NRC in ensuring safe transport of spent nuclear fuel. After each presentation, the audience was invited to ask questions and offer comments. NRC brochures and information sheets, along with copies of the draft Yucca Mountain Review Plan, were made available to attendees. Managers and staff from DWM and SFPO also met with local officials from Nye County (in Beatty and Tonopah), and the Eureka County Council (all three members traveled to Ely to meet with NRC staff), and addressed a session of the White Pine County Council. At every opportunity, staff affirmed: NRC's independence from the Department of Energy; NRC's primary mission of protection of public health and safety; and NRC's practice of reaching conclusions about all technical and licensing issues based solely on the evidence. Based on the comments received from participants at each of the public meetings, the meetings appeared to be well-received.

Clark County Yucca Mountain Nuclear Waste Advisory Committee Meeting

On April 11, 2002, the On-Site Representatives attended a public meeting of the Clark County Yucca Mountain Nuclear Waste Committee. At the meeting, a representative and attorney for the State's Agency for Nuclear Projects, Nuclear Waste Projects Office, discussed the Governor's "Notice of Disapproval of the Proposed Yucca Mountain Project" (i.e., veto, issued on April 8). The Notice of Disapproval was in response to the President's recommendation to Congress that the DOE be given permission to submit a License Application (LA) to the NRC for the potential geologic repository at Yucca Mountain. The State's representative emphasized that as long as the Governor's veto stands, the Yucca Mountain project is not legally viable. Also, the representative and attorney outlined the main thrust of four lawsuits filed by the state of Nevada. One suite challenges the Environmental Protection Agency with respect to its adoption of a 10,000-year time period of interest rather than taking the National Academy of

Sciences recommendation of 1 million years. Two suits against DOE challenge the Environmental Impact Statement and the siting guidelines, which the State claims unduly rely on an engineered barrier system, rather than on geologic barriers. The suit against NRC was presented as a challenge to 10 CFR Part 63, mainly on the basis of not requiring that the natural barrier(s) be dominant over engineered barrier(s).

6.0 FIELD AND LABORATORY TESTS AND NRC KEY TECHNICAL ISSUES

GENERAL SITE AND TESTING ISSUES

Site Work Stand-Down

A site work stand-down has led to the stoppage and/or delay of many of the ongoing tests, and the initiation of new test work, at the site. On March 26, 2002, an employee at the Yucca Mountain Project's Exploratory Studies Facility (ESF) was involved in a near miss electrical incident. At the surface facilities, an employee was hand-excavating a hole with an uninsulated metal bar, to verify the depth of buried utility lines, when a solid object was struck. The employee immediately stopped work, and further investigation revealed damage to a 2-inch PVC conduit containing an 480-volt energized power cable. Immediately following this near miss, a stand-down order was issued on all physical work at the site.

Certain site management activities and a root cause analysis are being conducted to address the stand-down. The site management activities, conducted by site management and employees, consist of: 1) the reauthorization of essential tasks needed for permit compliance, safety, infrastructure support, and work activities to prevent the loss of scientific data; and, 2) the development and implementation of recovery and start-up plans needed before the stand-down can be lifted. A root cause analysis team is: 1) gathering all data related to the near-miss; 2) identifying the internal causes that contributed to the near-miss; and, 3) analyzing options for preventing this type of incident from occurring in the future.

By the end of April, most passive and some active collection of data in the ESF and the Enhanced Characterization of the Repository Block (ECRB) tunnel had resumed to avoid a loss of data. Active collection of data from some existing tests, and the initiation of new tests, was on hold pending the review or rewriting of work orders or instructions, or the qualification of personnel. A final report of the findings of the root cause analysis team will be presented to DOE management in early May followed by a corrective action plan. The ORs will continue to evaluate the issues associated with the site stand-down and the results will be documented in a future OR report.

Site Access to Water Supply

In early April 2002, the State of Nevada terminated DOE's permits to access to Nevada Test Site (NTS) water wells for water supply to the Project. Prior to this, DOE installed a one-million gallon water reservoir in NTS Area 25, just east of Fortymile Wash along the road to Yucca Mountain. Access to certain surface areas at the Project has been restricted to reduce the need to spray water for dust suppression.

NRC Personal Safety Equipment is Being Stored On-Site

NRC or Center for Nuclear Waste Regulatory Analyses visitors who need to borrow safety gear to gain access to the surface or underground facilities for a site visit or to conduct field observations/investigations, need not go to the OR office to get it. Major safety items such as hardhats and goggles are now stored in a box in the DOE trailer on the North Portal pad. As usual, these items and additional required gear, such as steel-toed shoes, ear plugs, face masks, and filters can be obtained on site. Continue to notify the ORs to arrange for transportation, badging, and safety training, as well as the use of NRC equipment.

EXPLORATORY STUDIES FACILITY (ESF) TESTING

The excavation of the ESF, completed in 1997, allows the collection of scientific and engineering at Yucca Mountain. DOE continues testing in the ESF to supply data to support DOE's Total System Performance Assessment. Enclosure 2 shows the ESF test locations. Ongoing ESF testing activities are summarized below.

Seepage Testing - Alcove 7

Limited moisture monitoring and seepage testing continues at Alcove 7.

Alcove 5 (Drift Scale Test)

In accordance with the established test plan, power to the heated drift was turned off in mid-January 2002, and cool-down of the facility is currently being monitored. DOE is performing periodic visual and video inspection, water sampling, gas sampling, neutron logging, and electrical resistance tomography. The data being collected is primarily being used as input to the Thermal Testing AMR.

On March 1, 2002, an OR observed video logs taken in the heated drift since cool-down began. Some rock spalling was observed. However, the significance of this is unclear since spalling was observed before the heater was shut off.

Chlorine-36 (Cl-36) Validation Study

DOE scientists are proceeding with a study to validate the presence of bomb-pulse Cl-36 at two locations in the ESF. The new studies continue to show no bomb-pulse Cl-36 in the samples.

Research is currently focusing on new procedures for crushing samples and extracting Cl-36, increasing sample size, and repeating work on core samples from Niche 1 that showed Cl-36.

ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) TESTING

The excavation of the ECRB cross drift, completed in October 1998, allows the collection of scientific and engineering data in stratigraphic units that constitute the bulk of the potential repository horizon. DOE continues ECRB testing to supply data to support the DOE Total System Performance Assessment. Enclosure 2 describes the ECRB test locations. ECRB testing activities are summarized below.

Sealed Portion of the ECRB Cross-drift

On November 14, 2001, the bulkheads from Station 22+01 and beyond were closed. The bulkhead at Station 17+63 was closed on December 20, 2001. Prior to the closure of those bulkheads, project personnel installed enhanced monitoring and collection equipment, including remote cameras and moisture collection devices, in accordance with the revised test plan. Plastic sheets and drip cloths infused with a pH sensitive chemical were installed near the crown, and numerous sample bottles were placed to collect possible drips from rock bolts. A gas sampler was also installed. Rock samples were collected from both the Topopah Spring lower nonlithophysal and lower lithophysal zones for thermal conductivity measurements and analysis of geomechanical properties. Geologic mapping was also conducted.

As of the end of April 2002, monitoring with remote cameras indicate that there was still no dripping water in the sealed portion of the cross drift (beyond the ECRB bulkhead at 17+63). However, the drip cloths have become mottled and have changed color indicating that moisture is present (relative humidity readings have reached almost 100% in the isolated tunnel sections). Several drip cloths appear to have collected debris falling from overhead. A planned entrance into the unventilated sealed cross-drift for a quick visual inspection in early April did not happen as a consequence of the site stand-down.

DOE plans to keep the bulkheads in place until observations warrant tunnel entry for a closer look. The ORs will continue to monitor these test activities and document the results in future reports.

Alcove 8/ ESF Niche 3

Through April 8, 2002, the infiltration rate on the trench in Alcove 8 remained at approximately 9.0 liters per hour, and the seepage rate in ESF Niche 3 was roughly 5 percent of the infiltration rate. On April 8, 2002, DOE reduced the infiltration flux by about 50% to begin the next phase of infiltration testing. Seepage testing on this fault will likely continue through FY2002.

Niche 5

The results of previous infiltration testing are being reviewed. The next infiltration test continues to be set up.

ECRB Cross Drift Thermal Test

Thermal conductivity boreholes at Station 16+62 are instrumented and collecting data. The heating phase on the 6-hole test at Station 15+35 and the 3-hole test at Station 17+37 continues.

OTHER FIELD TESTING

Alluvial Tracer Complex (ATC)

The ATC is a joint Nye County and DOE Cooperative Program to investigate flow and transport properties of the saturated alluvium. Single-well ATC hydrologic and tracer testing at well NC-EWDP-19D/D1 (Enclosure 3) has been completed.

The next part of the testing program was to include cross-hole tracer tests at NC-EWDP-19D/D1, in which tracers would have been introduced via observation wells 19 IM1 and 19 IM2 (Enclosure 4). Well 19D1, in interval #4, the deepest zone in the saturated alluvium, was to have been pumped during those tests to recover the tracers through lateral flow from the observation wells.

These tracer tests were not scheduled to begin until the State of Nevada approved the specific groundwater tracers (by waiver) that were planned to be used. During the last reporting period DOE sent a permit waiver request to the State to seek approval for the cross-hole test tracers. However, by letter from the State Engineer, dated April 2, 2002, the site characterization activities at the site were deemed complete, and the previously granted permit waivers for all tests at the well 19 complex were considered expired on April 9, 2002. Because the expiration of these permits will impact efforts to validate the saturated zone flow and transport models, other alternatives to this testing are being investigated.

Saturated Zone Testing

On March 19, 2002, an aquifer test was begun in well Nye 22S. However, on March 20, 2002, the pump failed and the test was terminated. DOE had planned to collect groundwater samples for chemical analyses, but this will be postponed until the Westbay packer system is installed in this well.

Global Positioning Satellite Network Emerging Results

On April 26, 2002, the ORs were briefed on preliminary interpretations of the last few years of Global Positioning System (GPS) data gathered by Dr. B. Wernicke. Dr. Wernicke has a grant administered by the University of Nevada at Reno to measure absolute earth strain, reflected in the movement of the network of GPS stations scattered on and around Yucca. The Yucca Mountain site, on the North American (NA) tectonic plate, is drifting west-northwest and is impinging upon the Pacific plate drifting northwesterly. Dr. Wernicke considers that the Yucca Mountain site is in a transition zone between the plates. This may explain the level of in situ strain at the site, including seismicity, that is lower than the more rapidly drifting Pacific plate, but greater than the NA plate. Publication of the data and interpretation is planned.

LABORATORY STUDIES

Busted Butte Unsaturated Zone Transport Test

Atomic Energy of Canada, LTD. (AECL), is performing radionuclide transport tests on blocks of rock extracted from the Busted Butte Test Facility. The OR office has received the AECL January-February report on radionuclide migration experiments. The title of the report is "Radionuclide Migration Experiments in Non-Welded Tuff Under Unsaturated and Saturated Conditions" (authors: T. T. Vandergraaf, D. J. Drew, and K. V. Ticknor). These laboratory tests involve injection of fluorescein and radioactive tracers into 1 cubic meter blocks of tuff collected from the Calico Hills unit at Busted Butte. One block is used to represent unsaturated zone (UZ) experiments and the other for saturated tests. The following table shows the amounts of radionuclides that have been injected as of February 28, 2002, into the unsaturated block.

Tracer	Concentration (Bq/ml)	Quantity (Bq)
^{3}H	86.4 ± 2.3	1.3E7
^{22}Na	43.7 ± 1.2	6.7E6
^{60}Co	15.7 ± 0.8	2.4E6
^{99}Tc	101 ± 1	1.6E7
^{137}Cs	43.6 ± 1.5	6.7E6
^{237}Np	51.2 ± 2.0	7.8E6

The radioisotope inventory in the UZ tuff block has now reached 5.3 E7 Bq, or 1.4 mCi.

The radioisotope inventory in the saturated tuff block is about half that in the UZ block. Results continue to show strongly reducing chemical conditions in the SZ block. Most of the injected ^{99}Tc is being retained within the block. Research is continuing on the origin and persistence of reducing conditions in this block.

Engineered Barrier System (EBS) Testing (Atlas Facility)

The EBS Operations Office of the Yucca Mountain Project continues to perform EBS testing. These tests are performed in a Pilot Scale Test Facility located in North Las Vegas (Atlas facility). Test results are used to support the EBS degradation and transport process model report.

A test is also being performed to study the natural convection and moisture condensation in the post-closure time period. This test is being conducted to support elements of Key Technical Issues agreements Thermal Effects on Flow (TEF) 2.4, 2.5, and 2.10 and is currently underway at the EBS test facility.

UPCOMING TESTS AND STUDIES

Entrance into the Closed Portion of the ECRB Cross Drift

In order to gain access to the portion of the ECRB between the bulkheads at 17+63 and 22+01 to take geotechnical rock property samples and to do a slot test in the lower lithophysal zone, DOE is proposing to open the bulkhead at 17+63 as early as mid-June for about 4 months. This will allow entry and observation of the portion of the drift that has been closed since December 20, 2001.

Atlas Facility

DOE has developed a test plan to study the seepage flux through the drip shield in the post-closure time period. This test will begin in early May and is being conducted to support resolution on NRC Key Technical Issues agreement (Total System Performance Assessment and Integration (TSPAI) 3.16). The first part of this test will be on a simulated drip shield with a smooth surface. Later this summer, the test will be done on a drip shield with a rough surface to simulate the presence of corrosion products or dust.

DOE has also developed a test plan for Phase III of the EBS ventilation testing; however, these activities have not yet been initiated. This test is designed to provide data that will be used to validate the computer models of the removal of heat and moisture by the ventilation system.

Pena Blanca (Natural Analog Program)

As of the end of April, the drill rig needed for work at Pena Blanca was still at the U.S./Mexico border awaiting clearance to cross south of the border. However, a meeting held in El Paso on April 24, 2002, provided good results. DOE considers a planned start date of May 13, 2002, to be achievable.

Inyo County Deep Drilling Program

On April 16, 2002, the ORs were briefed on a newly funded program, directed by Inyo County, California, to drill deep wells in the county. The purpose is to penetrate the Lower Carbonate Aquifer and determine whether Yucca Mountain groundwater discharges into Franklin Playa, Death Valley, or both. The National Park Service is a cooperating agency and has already permitted drilling at the Travertine site in Death Valley National Park. About $750,000 is available this fiscal year to begin drilling. Full funding would enable 5 deep wells to be completed in the Lower Carbonate Aquifer.

7.0 GENERAL ACTIVITIES

a. Meetings

NRC Staff Attend DOE's Waste Package Materials Performance Peer Review Panel's Final Report Presentation

On March 18-19, 2002, members of the Division of Waste Management, including the ORs, and a representative from the Center for Nuclear Waste Regulatory Analyses, attended the presentation of the final report prepared by the Waste Package Materials Performance Peer Review Panel in Las Vegas, Nevada. The Panel, which was convened by DOE's Yucca Mountain Project, consisted of seven eminent corrosion experts from universities, a national laboratory, and a private research and development organization in the United States. The Panel summarized its review and addressed various topics including: (1) composition of aqueous environments; (2) materials metallurgical stability; (3) long-term uniform corrosion; (4) localized corrosion; (5) environmentally assisted cracking and stress corrosion cracking; and (6) hydrogen effects and contributing effects of design and fabrication factors on corrosion. The Panel concluded that the current waste package design is likely to meet performance criteria for

the repository, provided that specific technical issues are favorably resolved. Although the Panel noted that the technical basis supporting the suitability of Alloy 22 for the outer barrier of the waste package is substantial and growing, there is some uncertainty in the evaluation of the long-term performance of the waste package in the repository as a result of the extremely long life required. Various technical concerns were presented emphasizing the need for a better determination of the realistic range of aqueous environments, a better integration between design and fabrication efforts, and the testing and modeling of corrosion processes. In response to the Panel's findings, DOE presented updated assessment results of the corrosion behavior of waste package materials. The NRC's headquarters staff is currently reviewing the Panel's final report.

Yucca Mountain Technical Agreement Discussions with the Department of Energy

On April 15-16, 2002, members from the Division of Waste Management including the ORs participated in a Technical Exchange and Management Meeting with DOE, in Las Vegas. DOE's Key Technical Issue (KTI) Agreement Item Planning Strategy and the KTI agreements that DOE plans to address in FY 2002 were discussed. During the overview of the DOE KTI Planning Strategy, DOE discussed the process it used for binning the agreements, how the schedule for addressing the agreements was developed, and the method it used to document the work scope needed to address the agreements. DOE then discussed, briefly, each of the agreements it plans to address in FY 2002. No new agreements were reached at this meeting; however, the due dates and/or documentation method for several agreements were changed, one agreement was modified, and two agreements were closed. As of April 30, 2002, 41 of the 293 agreements are closed. The Nuclear Regulatory Commission currently has 16 agreements under review and DOE plans to address an additional 50 agreements before the end of FY 2002. A second Technical Exchange to discuss DOE plans to address FY 2003 and FY 2004 agreements is being scheduled for late June or July in Las Vegas.

NRC/DOE Quality Assurance and Management Meeting to Discuss Current Issues Related to the High-Level Waste Repository Program

On April 18-19, 2002, representatives from the Office of Nuclear Material Safety and Safeguards held a quarterly meeting with members of DOE's, Office of Civilian Radioactive Waste Management to discuss items of mutual interest related to their respective High-Level Waste (HLW) Repository Programs. The meetings were held in Las Vegas, Nevada, with video-conference and/or audio-conference participation from the NRC, the DOE Forrestal Office Building, the Center for Nuclear Waste Regulatory Analyses, and the NRC Region IV Offices. The meeting included observers from the State of Nevada, Affected Units of the local government, Nuclear Energy Institute, and public interest groups. Subsequent to providing an update on the HLW program, NRC management representatives expressed concern regarding the implementation of DOE Quality Assurance program, and the importance of addressing the agreements related to the subissues of the Key Technical Issues deemed important to repository performance by NRC staff. In addition, NRC management summarized its efforts on the public outreach program, including public meetings to be held in May 2002, in Nevada, on the draft Yucca Mountain Review Plan. DOE management provided updates on the HLW program and the Employee Concerns program. Further, DOE discussed its management improvement initiatives for correcting past problems. The next management meeting will be held in July 2002 at NRC Headquarters.

DOE's Design Review Considers New Concepts

On April 9-10, the ORs, one NRC headquarters, and two CNWRA staff participated in the DOE

and BSC design review meeting. This was not a public meeting and predecisional matters were discussed. Some of the topics that were discussed: included changes to the repository footprint, modular approach to underground layout, waste emplacement system options, staging areas, waste package designs and spacing, ventilation options, aging commercial spent nuclear fuel options, surface facility concepts, technical risks, design flexibility considerations, and materials performance testing.

Status of Integrated Site Model and Revision to DOE's 3D Geologic Framework Model

On April 23, 2002, the ORs were briefed on the status of the Integrated Site Model (ISM) and the Geologic Framework Model (GFM). The GFM, version 2000, will be issued in the summer of 2002. This revision will include data from new boreholes, an additional fault, software improvements, and various minor changes. The Rock Properties Model is scheduled to be revised in fiscal year 2003. The ISM revision is not yet scheduled. A revision of the thermal conductivity model for the Repository Host Horizon (RHH) units is scheduled for summer 2002. It is clear that the thermal conductivity models of the RHH will be used by thermal-mechanical modelers. The relationship of ISM to performance models will be discussed at a future briefing.

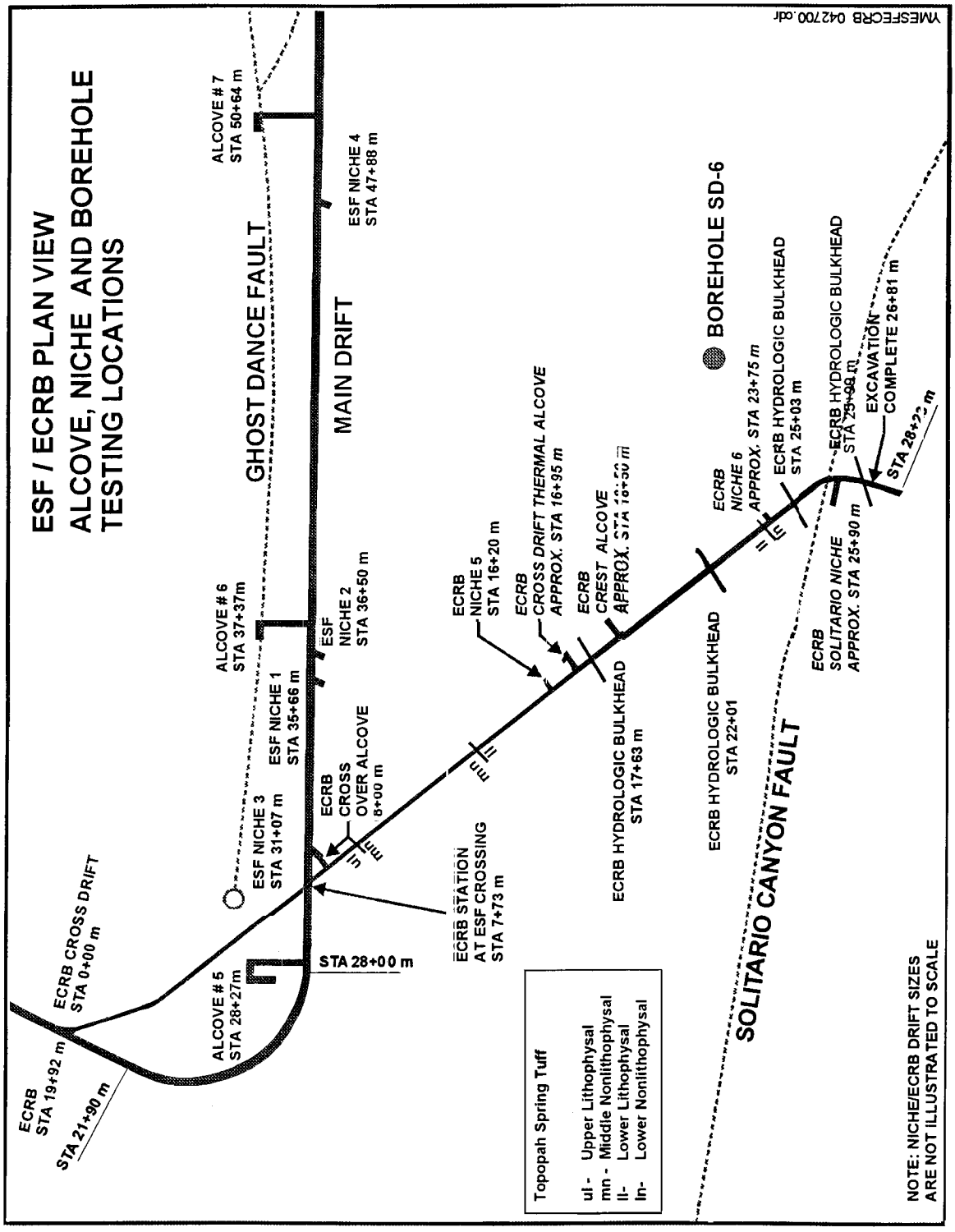
c. Site Visits

The Atlas facility was visited by J. Parrott and V. Mehrhoff on March 5, 2002, to observe the natural convection tests, preparations for the seepage flux test, and preparations for thermal conductivity measurements in welded tuff.

On March 26, 2002, R. Latta and N. Coleman, visited Yucca Mountain to complete required training for unescorted access to the underground areas. They received new underground training on how to access the "refuge chambers" in the cross drift. DOE has recognized that both Alcove 8 and the sealed cross drift can provide safe havens to workers in the event of fires or cave-ins that would prevent evacuation of the tunnel. If needed, workers can enter these areas and seal off the entries until safe conditions are restored or rescuers arrive. They also received respirators and associated fit tests to allow access to underground areas where respiratory protection is required.

On April 2, 2002, the ORs accompanied two personnel from the Division of High-Level Waste on a site visit to the Yucca Mountain facility. The purpose of this visit was to obtain an overview of DOE's site characterization activities.

There were no outstanding issues raised as a result of these visits.


ESF / ECRB PLAN VIEW
ALCOVE, NICHE AND BOREHOLE
TESTING LOCATIONS
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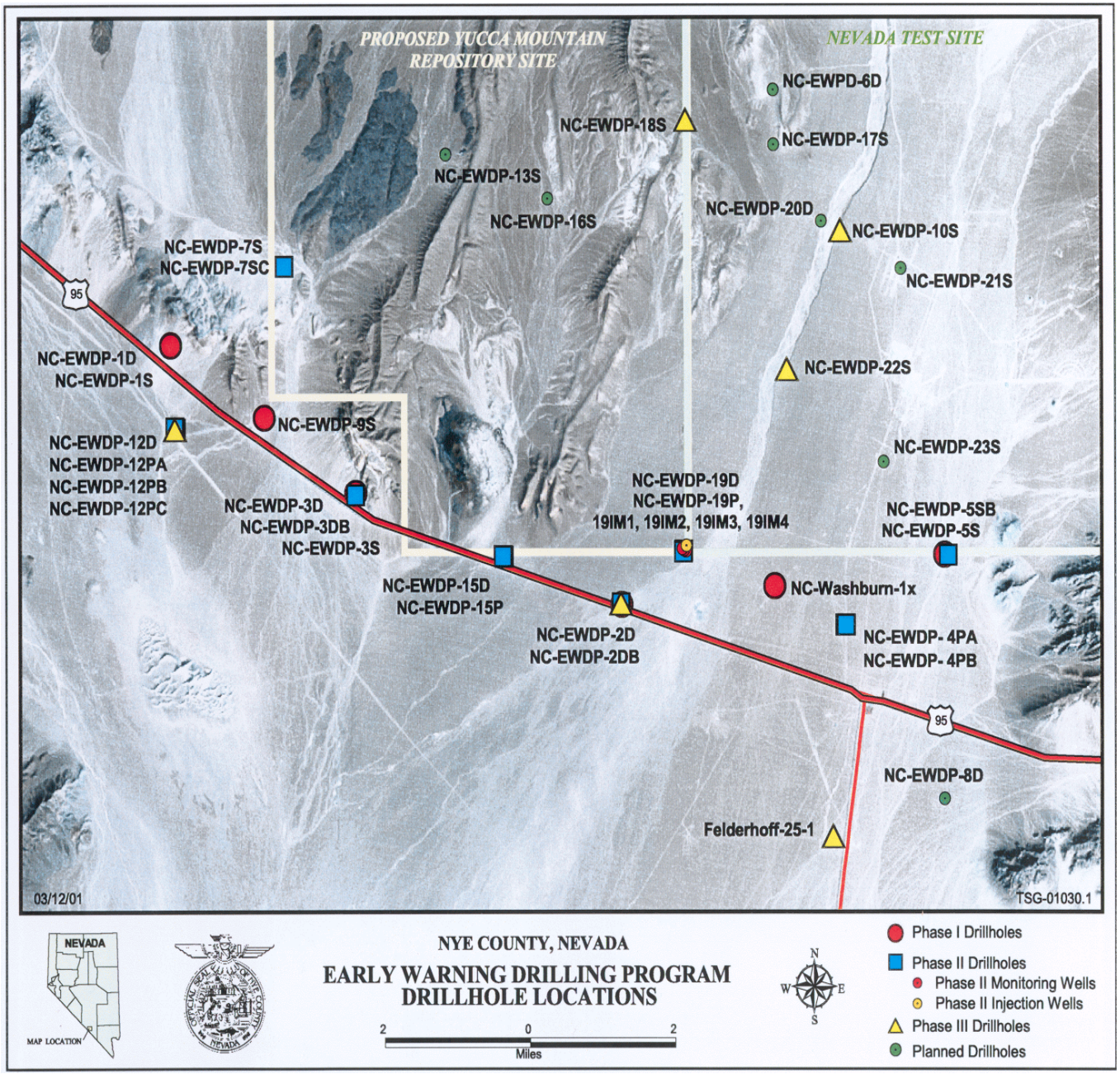
GHOST DANCE FAULT
MAIN DRIFT
ALCOVE # 7
STA 50+64 m
ESF NICHE 4
STA 47+88 m
ALCOVE # 6
STA 37+37m
ESF
NICHE 2
STA 36+50 m
ESF NICHE 1
STA 35+66 m
ESF NICHE 3
STA 31+07 m
ECRB
CROSS
OVER ALCOVE
STA 8+00 m
ECRB CROSS DRIFT
STA 0+00 m
ALCOVE # 5
STA 28+27m
STA 28+00 m
ECRB STATION
AT ESF CROSSING
STA 7+73 m
ECRB
NICHE 5
STA 16+20 m
ECRB
CROSS DRIFT THERMAL ALCOVE
APPROX. STA 16+95 m
ECRB
CREST ALCOVE
APPROX. STA 18+50 m
ECRB HYDROLOGIC BULKHEAD
STA 17+63 m
ECRB HYDROLOGIC BULKHEAD
STA 22+01
BOREHOLE SD-6
ECRB
NICHE 6
APPROX. STA 23+75 m
ECRB HYDROLOGIC BULKHEAD
STA 25+03 m
ECRB HYDROLOGIC BULKHEAD
STA 25+99 m
EXCAVATION
COMPLETE 26+81 m
STA 28+32 m
ECRB
SOLITARIO NICHE
APPROX. STA 25+90 m
SOLITARIO CANYON FAULT
ECRB
STA 19+92 m
STA 21+90 m
Topopah Spring Tuff
ul - Upper Lithophysal
mn - Middle Nonlithophysal
ll- Lower Lithophysal
ln- Lower Nonlithophysal
NOTE: NICHE/ECRB DRIFT SIZES
ARE NOT ILLUSTRATED TO SCALE

Enclosure 2

Enclosure 3


PROPOSED YUCCA MOUNTAIN REPOSITORY SITE
NEVADA TEST SITE
NC-EWPD-6D
NC-EWDP-18S
NC-EWDP-17S
NC-EWDP-13S
NC-EWDP-16S
NC-EWDP-20D
NC-EWDP-10S
NC-EWDP-7S
NC-EWDP-7SC
NC-EWDP-21S
95
NC-EWDP-1D
NC-EWDP-1S
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NC-EWDP-19D
NC-EWDP-19P,
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NC-EWDP-3D
NC-EWDP-3DB
NC-EWDP-3S
NC-EWDP-5SB
NC-EWDP-5S
NC-EWDP-15D
NC-EWDP-15P
NC-Washburn-1x
NC-EWDP-2D
NC-EWDP-2DB
NC-EWDP- 4PA
NC-EWDP- 4PB
95
NC-EWDP-8D
Felderhoff-25-1
03/12/01
TSG-01030.1
NEVADA
MAP LOCATION
NYE COUNTY, NEVADA
EARLY WARNING DRILLING PROGRAM
DRILLHOLE LOCATIONS
2 0 2
Miles
N
W
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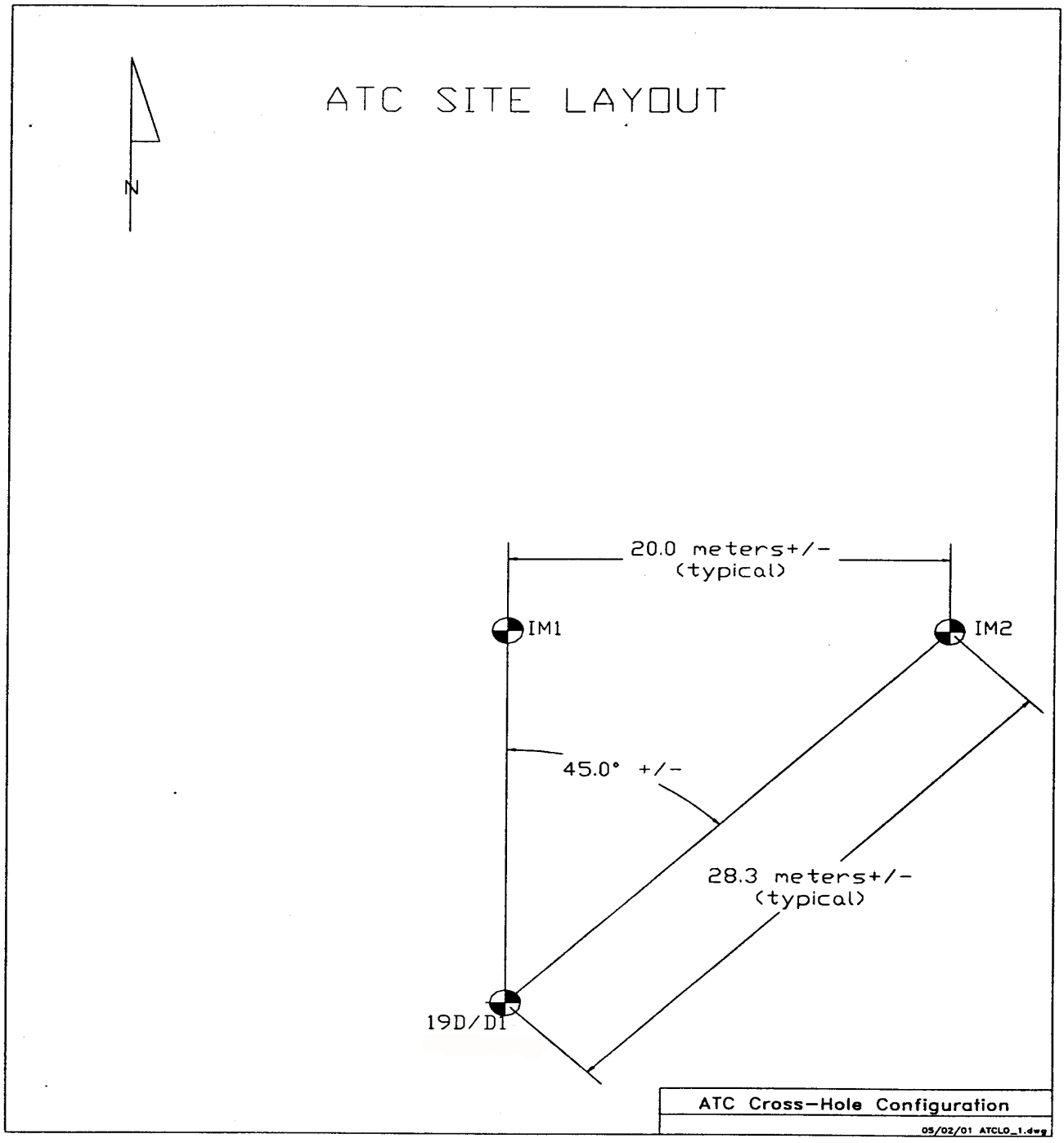
S
Phase I Drillholes
Phase II Drillholes
Phase II Monitoring Wells
Phase II Injection Wells
Phase III Drillholes
Planned Drillholes


ATC SITE LAYOUT
N
20.0 meters+/-
(typical)
IM1
IM2
45.0° +/-
28.3 meters+/-
(typical)
19D/D1
ATC Cross-Hole Configuration
05/02/01 ATCLO_1.dwg

Enclosure 4